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ABSTRACT

This study tested the claim that television viewing reduces preschoolers' perseverance, increases their impulsivity, and induces restlessness. In the first of two laboratory visits with a parent, 328 5-year-olds were given the Peabody Picture Vocabulary Test. During the second visit, the parent completed the Parent Temperament Questionnaire and the child worked on the Banta Replacement Puzzle and the Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP). Children were coded for time to first look away from the Banta, number of looks away, and total time on task. Between the visits, the parent completed a television viewing diary for the child. Programs listed in the diaries were divided by coders into 17 categories. Results indicated that there were no correlations between the perseverance measure of the Banta puzzle and children's viewing of programs in any of the 17 program categories. Nor were there any correlations between children's viewing and impulsivity measures from the KRISP. Total weekly amount of children's television viewing was positively associated with the level, frequency, and tempo of children's physical activity. A list of 24 references is included. (BC)

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The impact of television on preschoolers' perseverance, impulsivity and restlessness

by

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ABSTRACT

It is popularly claimed that television shortens preschoolers' attention span, reduces perseverance, increases impulsivity, and induces restlessness. This study examined whether 328 preschoolers' in-home exposure to any of 17 different categories of programming could predict performance on the KRISP, the Banta Replacement Puzzle and three different subscales of the Parent Temperament Questionnaire. A single zero-order correlation supported the claim that television induces restlessness. The overwhelming majority of results, however, provided no support for the popular claims.

INTRODUCTION

Popular accounts of television's impact on cognitive development frequently include claims that television shortens a child's attention span, decreases perseverance, increases restlessness and even induces hyperactivity. In a recent article, "Chaos on Sesame Street" for example, Jane Healy (1990) argues that children who are regularly exposed to Sesame Street's magazine format and rapidly changing visual images become accustomed to having their "...attention jerked around every few seconds" (p 27). The result, according to Healy, is children who are incapable of sustaining a train of thought or persevering in a difficult task. Healy's claims are not new. Rather, the same effects have been attributed to television as a medium for over a decade (e.g. Neil Postman, 1979; Joel Swerdlow, 1981; Marie Winn, 1985).

If these claims are true there is certainly cause to be concerned for children. Academic studies estimate that preschooler's spend an average thirteen to twenty hours per week with television (Anderson, Field, Collins, Lorch and Nathan, 1985; Huston, Wright, Rice, Kerkman and St. Peters, 1990). Commercial estimates are even higher. Moreover, the ability to sustain attention contributes to performance in most, if not all, cognitive tasks. Thus, if exposure to television does lead to a shortened attention span or a reduced ability to persevere, the potential negative consequences on cognitive development may be far-reaching.

Despite their potential importance these claims have been subject to only a handful of studies. The results of some suggest that exposure to action-adventure, or violent, programming may over time induce a decreased tolerance for delays (Friedrich and Stein, 1973; Singer, Singer and Rapaczynski, 1984), increased impulsivity (R. Anderson and Maguire, 1978; Gadberry, 1980), and at least in high-IQ children, decreased persistence (Friedrich and Stein, 1973). Other data suggest that extended exposure to children's educational programming may lead to a more reflective conceptual tempo (Gadberry, 1989; Stein and Friedrich, 1975), increased tolerance for delays, and again in high-IQ children, an increase in perseverance (Friedrich and Stein, 1973).

Several qualifications should apply in interpreting these data, however. First, two experimental studies have reported no viewing condition effects (Anderson, Levin and Lorch, 1977; Tower, Singer, Singer and Biggs, 1979). Second, because the majority of significant findings have been obtained in experimental settings it is unclear whether they are limited to the specific program episodes included in the studies (in at least one case the shows emphasized the benefits of persistence and self-control). Third, of the two correlational studies, one used an unvalidated measure of exposure and the other used a smaller sample than would be recommended for the analyses conducted.

Unlike prior research, the present investigation used a validated measure of in-home levels of exposure to television, as well as precisely defined categories of programming. It also included multiple measures of the abilities that have been claimed to be affected, and involved a sample more than five times the size of that used in the one prior correlational study of preschoolers.

METHOD

The data reported here are taken from a larger ongoing study of TV viewing at home by preschoolers and their families. Data were collected during 1980 and 1981 in the Springfield, MA area. Detailed descriptions of data collection and reduction are available in Anderson et al. (1985) and in Nathan, Anderson, Field, and Collins (1985).

Subjects. Subjects were 328 preschoolers (160 boys, 168 girls) within three months of their fifth birthday. Ninety-seven percent were white and seventy-seven percent were from families in the two highest income status levels outlined by Hollingshead's Four Factor Index of Social Status (1975).

Testing Procedure. Each five-year-old visited the laboratory (with a parent) on two separate occasions, approximately five weeks apart. During the first visit the Peabody Picture Vocabulary Test (PPVT), and several tasks not relevant to this paper, were administered to the five-year-old. In addition, the parent was instructed in how to complete the Nielsen-like ten day home-viewing diary. One diary was provided for each working TV in the home.

Approximately one month later the second diary period began (parents had been mailed new diaries). Within five days of its completion the parent and child returned to the laboratory bringing the second set of completed diaries with them. During this session the parent filled out three surveys, one of which was Thomas and Chess' (1977) Parent Temperament Questionnaire (PTQ). The activity level, persistence and distractibility subscales of this instrument were included in the present analyses.

The child began the visit by playing an experimenter designed video game for ten minutes. This was followed by trying to solve Banta's (1970) difficult wooden puzzle for five minutes. The puzzle task provided three measures of the child's perseverance when faced with a difficult problem. They were time to first look away, number of looks away, and total time oriented to the task.

Next, the Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP) was administered. A special version of Kagan's Matching Familiar Figures Task specially

adapted for preschoolers, the KRISP requires the child to select from four alternative line-drawings the one that matches the standard. Children who respond with longer latencies and fewer errors are described as reflective, those with shorter latencies and more errors as impulsive (Kagan, Rossman, Day, Albert and Philips, 1964).

When two other tasks not relevant here were finished the parent and child were thanked for their participation and given a gratuity of fifteen dollars to compensate them for the considerable time and trouble they invested in the research.

The mean, median and standard deviation for each of the cognitive status variables are presented by sex in Table 1. As can be seen there, subjects generally scored above average in IQ; the mean percentile score was 72.8. Boys scored slightly but significantly higher than girls on the PPVT ($t = 2.073$, SE = 1.613, $p < .04$).

The KRISP results were similar to those reported for the same age group in Wright's (1978) normative sample. Sex was not a factor in accuracy but girls were significantly faster responders than boys (Welch's $t' = -2.919$, $p < .01$).

There were no sex differences in Banta scores. Nor did the sexes differ on the PTQ persistence subscale. Boys were, however, reported to have a higher level, tempo and frequency of motor activity than girls ($t = 2.014$, SE = 9.410, $p = .045$). In addition, a significant difference on the distractibility subscale indicated that environmental stimuli were more effective in interfering with or "altering the direction" of girls' rather than boys' ongoing behavior ($t = 2.355$, SE = 9.416, $p < .02$).

Home-viewing Diaries. Viewing was recorded in fifteen minute blocks that spanned from six a.m. to two a.m. the following day. For each block, parents indicated whether the TV was on, to what station and program it was tuned and who was in the room. An individual was marked as present during a block if he/she remained in the viewing room for at least six of the fifteen minutes comprising that block.

Earlier papers from this database compared the amount of TV exposure reported in the diaries with that observed on time-lapse videotapes. The diaries were found to accurately estimate time spent with TV, especially for the five-year-olds who were the focus of the study; $r(95) = .84$, $p < .001$ (Anderson et al., 1985). Since broadcast schedules are both published and largely consistent from week to week, it is likely that programs are reported with as much or more accuracy as viewer presence. It was sometimes the case that parents were uncertain about what program was being viewed. The impact of such ambiguity was small, however, amounting to an average of just over one half hour of viewing time per week (an average of 4 percent of total viewing time).

Since diaries began on different days of the week for different families, the three days of the week that were sampled twice was not constant across families. This might have introduced artificial differences in levels of exposure to some categories of programming (e.g. cartoons which dominate Saturday morning broadcast schedules). Thus, days one, two and ten were eliminated from each diary period, yielding fourteen days of data for each child.

Program Categories. Each of the 666 different programs reported to be on when a five-year-old was in the room was classified on nine different dimensions defined in the CRITC Program Categorization System (Center for Research on Television's Influence on Children, 1983). Coding decisions were based on the coder's knowledge of the programs as well as descriptions appearing in TV Guide. All but eight of the programs were at least partially classified. For no dimension did the proportion of programs that was codable differ more than three percent from the level published by Huston et al, 1990.

One of the aims of this study was to determine whether in-home levels of exposure were related to the cognitive variables in ways predicted by prior experimental research. Thus, the subset of CRITC categories chosen for inclusion in the present study was comprised of all the individual programs and program types used in earlier research. These categories were cartoons, soap operas, situation comedies, Misterogers' Neighborhood, Sesame Street, informative, entertainment, nature, action-adventure, animated action-adventure, live action-adventure, child-informative, commercial and public broadcast station programming. Three additional categories were based on the length of time typically devoted to inter-related content. Television's frequent shifts in content (i.e. brief segments) are often blamed for shortening viewers' attention spans. See Table 2 for a complete list of program category definitions.

Levels of exposure. Subjects spent a considerable amount of time with TV, an average 15.117 hours per week (all exposure totals are averaged across diary periods). The mean and median number of hours per week of exposure to each program category are presented by sex in Table 3. The distribution of exposure times was skewed to the right for all categories of programming. When parent distributions are skewed and of the same shape, the Wilcoxon Rank Sum (WRS) has a power advantage over t-tests for group differences (Myers and Well, 1990). To determine whether the skewed distributions of male and female exposure levels were similarly shaped, t-tests of average absolute deviations from group medians were conducted (Brown and Forsythe, 1974). The results indicated that the distributions for males and females were similarly shaped for all program categories but one. Thus, Welch's t' was used to test for a sex difference in exposure to live action-adventure programming; all other sex differences were tested using the WRS.

Levels of exposure were generally similar across sex. The exceptions involved exposure to cartoons and action adventure programming (both Z's > 2.617, $p < .01$), which boys spent more time with than girls. The differences in action-adventure program exposure were evident in the live ($t' = 2.687$, $p < .008$) and animated ($Z = 2.299$, $p < .023$) sub-categories as well. Similar sex differences in exposure to cartoons and action-adventure programming have been reported by others (Comstock, Chaffee, Katzman, McCoombs and Roberts, 1978; Huston et al, 1990).

RESULTS AND DISCUSSION

Analytic Procedures. Individual regression equations that predicted performance on each cognitive measure (from total TV exposure and exposure to the category in question) were calculated for each sex. Only when unstandardized regression coefficients were not significantly different at the alpha = .10 level were male and female data combined (Pedhazur, 1973). Given the space constraints on the current presentation, partial correlations (rather than regression equations) are reported here (the pattern of results was identical for both). Finally, it should be noted that KRISP average response time and time to first look away in the Banta were subjected to a natural log transformation in order to stabilize variances. In addition, the number of looks away from the Banta and the total number of errors in the KRISP required square root transformations for the same reason.

Perseverance. The fifty-one partial correlations between the three measures of perseverance from the Banta puzzle and the seventeen categories of exposure are presented in Table 4. None were significant at the one percent alpha level (chosen because the large number of comparisons made was likely to inflate error rates) for either sex or when data were combined. The results for the PTQ distractibility and persistence subscales were similar (see Table 5) with one exception. Girls' exposure to soap operas was significantly negatively correlated with distractibility scores (a "beneficial" relation, $r_{12.3} = -.209$, $p < .01$, $n = 168$); boys' was not ($r_{12.3} = -.013$, $p > .10$, $n = 160$), and the difference was significant ($Z = 1.910$, $p < .056$). Given the large number of correlations calculated, it is likely this result was due to chance. In any case, the data did not support the claim that television shortens a child's attention span or reduces perseverance.

Impulsivity. Nor did the data support the assertion that television induces impulsivity; no category of exposure correlated both positively with the number of errors and negatively with latency to respond in the KRISP. Instead, two significant negative correlations with the number of errors (a "beneficial" relation, both n's = 160, p's < .01) were obtained (see Table 6). They involved boys' exposure to informative ($r_{12.3} = -.232$), especially child-informative programs ($r_{12.3} = -.241$). In addition, two categories were positively correlated with boys' number of errors in

the KRISP (a "deleterious" relation; again both n's = 160, p's < .01). Specifically, boys' exposure to programs with moderately long segments ($r_{12.3}$ = .228) and exposure to entertainment programming ($r_{12.3}$ = .214) were positively correlated with the number of errors. When IQ was also controlled, however, none of the four categories of programming was a significant predictor of accuracy in the KRISP. Thus, while one might interpret the pattern obtained for boys as indicating a "beneficial" association between informative program exposure and impulsivity and a "deleterious" association with entertainment programming, it is also possible that the associations involve not impulsivity but intellectual competence in general. It should be noted that none of the thirty-four partial correlations with girls' performance on the KRISP were significantly different from zero, though all were significantly different from the non-zero correlations for boys (all Z's > 3.072, p < .003).

Activity Level. One result involving activity level scores supported the negative claims. Total weekly time with TV was positively associated with the level, frequency and tempo of physical activity (r = .147, p < .01, n = 328). It was also the case, however, that one of the seventeen partial correlations with activity level scores was significantly negative (see Table 7). Within groups of boys who spent the same total time with TV, those who spent more time with Misterogers' Neighborhood had significantly lower activity level scores ($r_{12.3}$ = .263, p < .01, n = 160). This was not true for girls ($r_{12.3}$ = .049) and the difference between partial correlations was significant (Z = 2.535, p < .011). Thus, if television induces restlessness, specific program choices may have an impact on the size of the effect. Since these correlations cannot establish that television played a causal role, it is also possible that less active boys prefer to spend time with Misterogers' Neighborhood. On the other hand, some unmeasured variable (e.g. weather conditions) may have been responsible for both activity level and total time with TV.

In sum, while correlational methods cannot eliminate the possibility of non-linear relations, or establish the direction of causality, the overwhelming lack of "negative" findings provides cause for optimism. This is especially true for the various types of educational programming included in this study. Moreover, the overall pattern of results casts some doubt on the claims that television in general has a negative impact on preschoolers' attention span, perseverance, and impulsivity. Finally, it should be noted that further analyses involving demographic, home environment, and weather variables are planned at this time. Until those analyses have been completed, the findings reported here should be considered tentative.

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TABLE 1

Means, medians and standard deviations
for cognitive variables by sex

	Females		Males	
	Mean	Median	Mean	Median
Banta				
First Look Away	63.744 (80.367)	29.100	53.244 (75.483)	20.300
No. Looks Away	7.707 (6.501)	6.000	7.642 (5.435)	7.000
Time On Task	75.810 (26.522)	284.700	275.494 (30.692)	285.700
KRISP				
Avg. Response Time	4.367[a] (1.550)	4.110	4.914[a] (1.824)	4.660
No. of Errors	3.257 (3.002)	2.000	3.225 (2.431)	3.000
PPVT				
IQ	111.145[b] (14.476)	110.000	114.488[b] (14.637)	117.000
Percentile	69.807 (26.389)	76.000	75.944 (25.060)	87.000
Temperament				
Activity Level	372.405[b] (84.514)	375.000	391.356[b] (85.883)	400.000
Distractibility	493.548[b] (83.235)	487.000	471.375[b] (87.299)	475.000
Perseverance	410.185 (64.767)	412.000	410.113 (64.818)	412.000

[a]$t' > 2.918$, $p < .01$; [b]$t > 1.968$, $p < .05$

TABLE 2

Program Category Definitions

Action Adventure	Westerns, police, detective, and crime stories; all other programs featuring adventure and heroes
Animated Action	All action shows that were also at least partially animated
Live Action	All action programs without animation
Cartoons	All fully animated programs
Child-Informative	Programs intended to inform and produced for children aged 12 or less
Commercial	Programs aired on cable or network stations
Content Units	Categories based on length of time typically devoted to related content
Short	Content units typically lasting 15 m or less
Moderate	16 m to 1 hour long content units
Long	Content units longer than 1 hour, but complete within one episode
Entertainment	Programs not specifically designed to inform; includes live sports coverage
Informative	Programs primarily intended to inform or instruct the audience
Nature	Documentaries that focus on nature and science
Public Broadcasting	Programs aired on PBS stations
Situation Comedies	Comedy stories with a regular cast of characters in silly situations
Soap Operas	Dramas with story lines that span an indefinite number of episodes

TABLE 3

Mean and median hours of exposure with standard deviations by sex
(n's = 168 and 160)

Program Type	Females Mean	Females Median	Males Mean	Males Median
Action Adventure[a]	1.704 (1.828)	1.250	2.223 (1.966)	1.750
Animated Action[b]	0.933 (1.232)	0.500	1.132 (1.147)	0.750
Live Action[c]	0.771 (0.979)	0.500	1.091 (1.165)	0.875
Cartoons[a]	2.727 (2.807)	2.000	3.198 (2.430)	2.875
Child-Informative	4.297 (4.062)	3.563	4.484 (3.600)	3.813
Commercial	10.589 (6.853)	8.875	11.202 (6.734)	10.500
Entertainment	8.533 (6.376)	7.000	9.377 (6.405)	8.250
Informative	5.294 (4.607)	4.188	5.509 (4.130)	4.563
Long Content Units	0.808 (1.141)	0.500	0.996 (1.520)	0.625
Mister Rogers	0.379 (0.586)	0.000	0.454 (0.587)	0.250
Moderate Content Units	4.690 (3.567)	3.938	5.202 (3.769)	4.625
Nature	0.206 (0.468)	0.000	0.263 (0.457)	0.000
Public Broadcasting	2.667 (3.018)	1.750	3.073 (3.008)	2.063
Sesame Street	1.653 (1.956)	1.000	1.905 (1.932)	1.375
Short Content Units	7.493 (5.466)	6.438	8.129 (4.974)	7.500
Situation Comedies	2.563 (2.444)	2.000	2.497 (2.255)	1.688
Soap Operas	0.6410 (1.521)	0.000	0.416 (0.801)	0.000
Total Exposure	14.606 (9.076)	12.438	15.654 (8.500)	15.125

[a]$Z > 2.617$, $p < .010$; [b]$Z = 2.299$, $p < .023$; [c]$t' = 2.687$, $p < .008$

Table 4

Partial correlations between Banta scores and exposure hours controlling for total exposure[a]
(n = 326)

Program Type	Time on Task	First Look Away	No. Looks Away
Action Adventure	.005	.000	-.041
Animated Action	.036	.021	-.040
Live Action	-.028	-.023	-.022
Cartoons	.031	.012	-.056
Child Informative	-.005	.094	.032
Commercial	-.069	-.057	.000
Entertainment	.024	-.086	-.046
Informative	-.019	.079	.032
Long Content Units	.070	-.031	-.001
Mister Rogers	.056	.071	-.040
Moderate Content Units	-.007	-.067	-.047
Nature	.000	.019	.054
Public Broadcasting	.043	.077	-.017
Sesame Street	.024	.110	.000
Short Content Units	.000	.067	.022
Situation Comedies	.010	-.090	-.022
Soap Operas	-.045	-.025	.001

[a]$p < .05$ when $|r_{123}| > .108$; $p < .01$ when $|r_{123}| > .142$

Table 5

Partial correlations between PTQ scores and exposure hours controlling for total exposure[a]
(n's = 168, 160 and 328)

	Distractibility			Persistence		
Program Type	Females	Males	All	Females	Males	All
Action Adventure	.179*	-.013*		-.010	-.022	-.016
Animated Action	.177*	-.053*		.000	.000	.000
Live Action	.084	.029	.039	-.014	-.031	-.022
Cartoons	.101	-.015	.039	.035	-.022	.011
Child Informative	.039	.036	.035	-.066	.049	-.011
Commercial	.000	-.033	-.012	.033	.000	.011
Entertainment	.037	-.003	.015	.067	-.047	.011
Informative	-.022	.000	-.008	-.060	.059	.000
Long Content Units	-.024	-.070	-.051	-.026	.043	.011
Mister Rogers	-.078	.000	-.046	-.010	.025	.011
Moderate Content Units	.115	.016	.065	.017	.022	.016
Nature	.094	-.005	.037	-.144	-.013	-.078
Public Broadcasting	.000	.065	.030	-.019	-.013	-.016
Sesame Street	.000	.055	.021	.026	-.036	.000
Short Content Units	.000	.024	.008	-.019	-.025	-.022
Situation Comedies	.064	-.008	.038	.066	.012	.042
Soap Operas	-.209*	.011*		.067	-.028	.034

*correlation differs significantly by sex, $p < .10$

[a]$p < .05$ when $|r_{123}| > .151$, .155, and .108; $p < .01$ when $|r_{123}| > .198$, .203, and .142 for females, males and all subjects, respectively.

Table 6

Partial correlations between KRISP errors and exposure hours controlling for total exposure[a] (n's = 167, 160 and 327)

Program Type	Females	Males	All Subjs.
Action Adventure	-.048	.115	.020
Animated Action	-.048	.000	-.026
Live Action	-.022	.160	.055
Cartoons	-.103*	.095*	
Child Informative	.169*	-.241*	
Commercial	.000	.179	.081
Entertainment	-.053*	.214*	
Informative	.096*	-.232*	
Long Content Units	-.095	-.054	-.084
Mister Rogers	.075	-.090	.000
Moderate Content Units	-.039*	.228*	
Nature	.000	-.118	-.048
Public Broadcasting	.112*	-.191*	
Sesame Street	.147*	-.191*	
Short Content Units	.081*	-.202*	
Situation Comedies	.000	.153	.064
Soap Operas	.148	.123	.148

*correlation differs significantly by sex, $p < .10$

[a]$p < .05$ when $|r_{12.3}| > .152$, .155, and .109; $p < .01$ when $|r_{12.3}| > .199$, .203, and .142 for females, males, and all subjects, respectively.

TABLE 7

Partial correlations between activity level scores and exposure hours controlling for total exposure[a]
(n's = 168, 160 and 328)

	Females	Males	All Subjs.
Action Adventure	-.137	.000	-.056
Animated Action	-.127	-.068	-.092
Live Action	-.079	.050	.025
Cartoons	-.096	-.102	-.092
Child Informative	.066*	-.119*	
Commercial	.077	.054	.064
Entertainment	-.039	.090	.039
Informative	.080*	-.110*	
Long Content Units	-.074*	.126*	
Mister Rogers	.049*	-.263*	
Moderate Content Units	-.031	.040	.025
Nature	.024	-.041	-.025
Public Broadcasting	.024	-.130	-.066
Sesame Street	.039	-.035	-.017
Short Content Units	.069	-.106	-.035
Situation Comedies	.024	.045	.025
Soap Operas	.137	-.020	.056

*correlation differs significantly by sex, $p < .10$

[a]$p < .05$ when $|r_{12.3}| > .151$, .155, and .108; $p < .01$ when $|r_{12.3}| > .198$, .203, and .142 for females, males, and all subjects, respectively.